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CLIMATE AND LAND USE CHANGE • WATER • CORE SCIENCE SYSTEMS • ECOSYSTEMS • ENERGY AND MINERALS • NATURAL HAZARDS • ENVIRONMENTAL HEALTH

A Use Case for Coastal Imagery to Further Data Integration

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U.S. Geological Survey

CDI Webinar Series 2013

The Team

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- USGS, St. Petersburg, FL
- Carolyn Degnan
- USGS, Santa Cruz, CA
- VeeAnn Cross
- USGS, Woods Hole, MA
- Trent Faust
- Volunteer, USGS, St. Petersburg, FL

The Problem

National Assessment of Coastal Change Hazards (NACCH) project currently has a database containing over 140,000 coastal oblique images.

If a researcher needed an image for a presentation or publication, they often had a long route to find the person (me) to get it from. Whether and how quickly they could get their desired image(s) depended on:

- **Whether I was available**
- **Whether I had time to retrieve it**
- **Whether the request found it's way down the chain to me to begin with**

How do we use a Use Case and apply it to a real data problem?

Use Cases

First developed in 1986 by Ivar Jacobson

Definition:

A list of steps, typically defining interactions between a role (known as an "actor") and a system, to achieve a goal. The actor can be a human or a computer system.

Briefly: Use Case Methodology

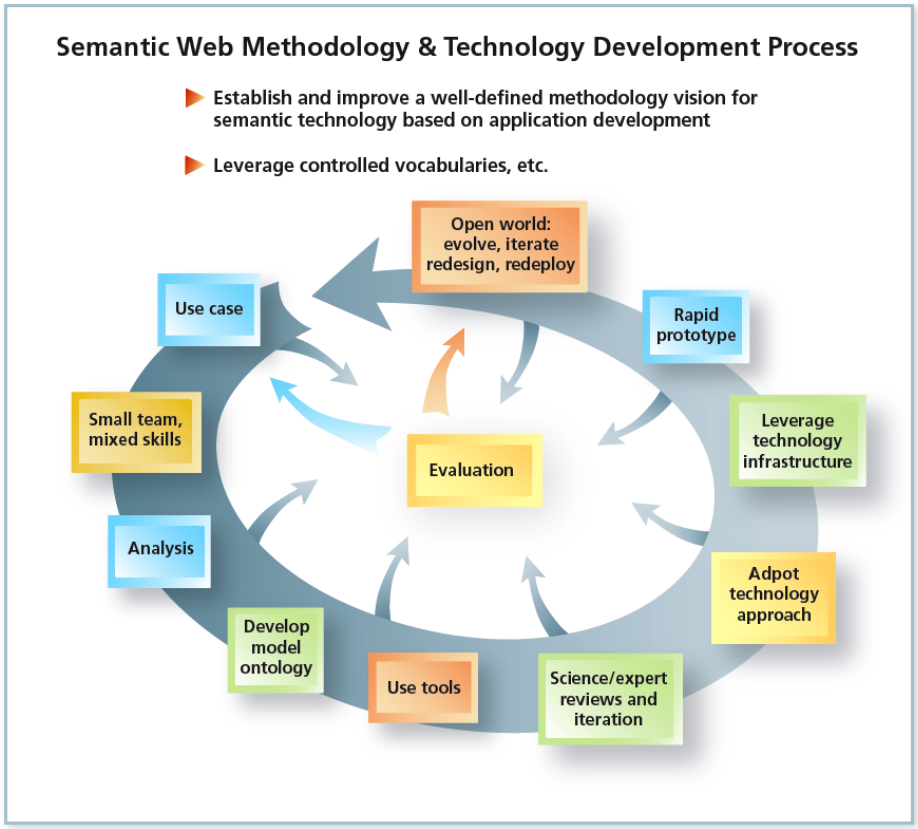
Peter Fox, RPI

Allows for rapid prototyping and system development.

Started by Fran Lightsom in Woods Hole.

First meeting: Wood Hole 2011
St Pete 2012
Santa Cruz 2012
Last Meeting: St Pete 2013

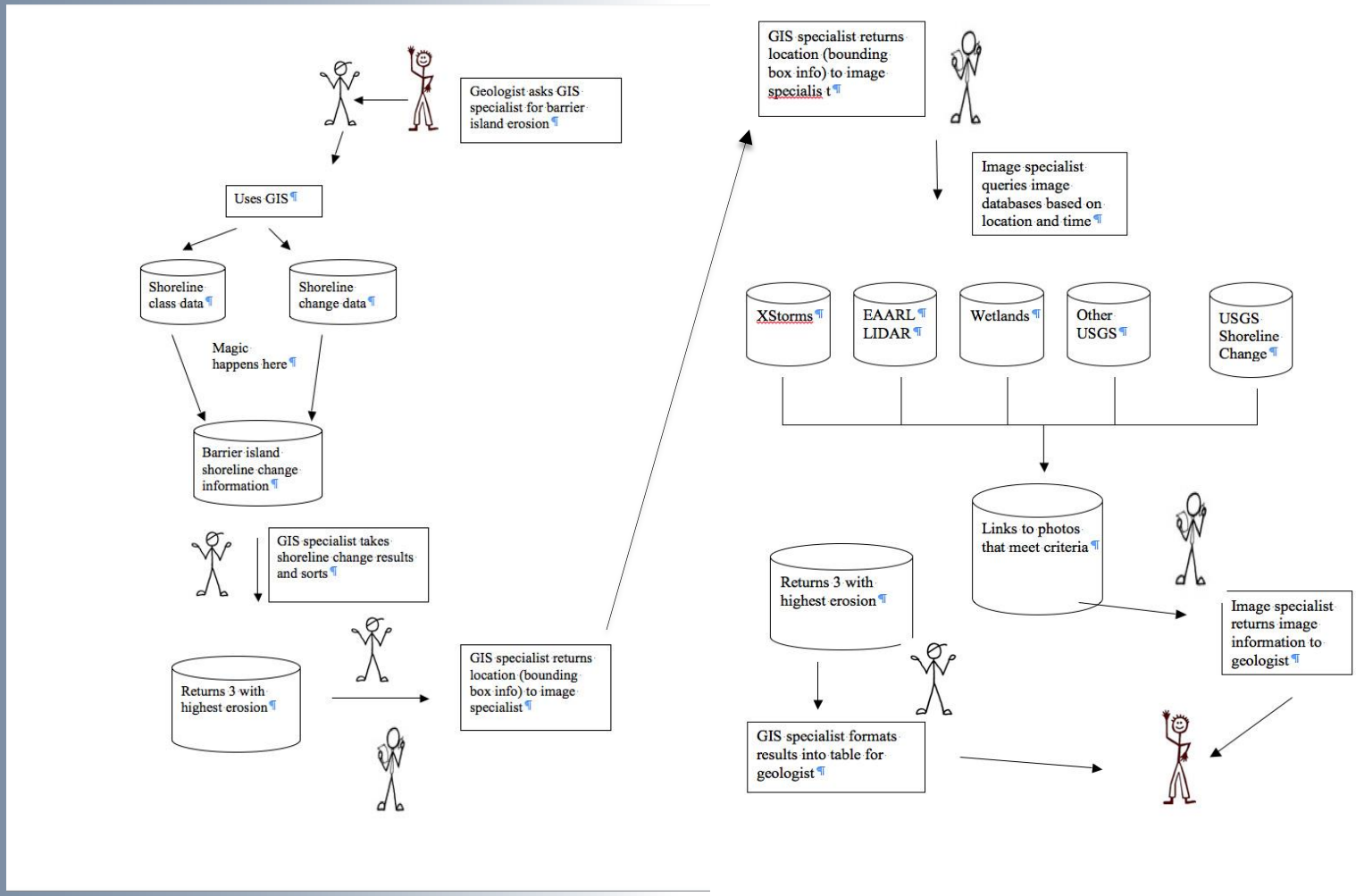
Plus: numerous WebEx sessions



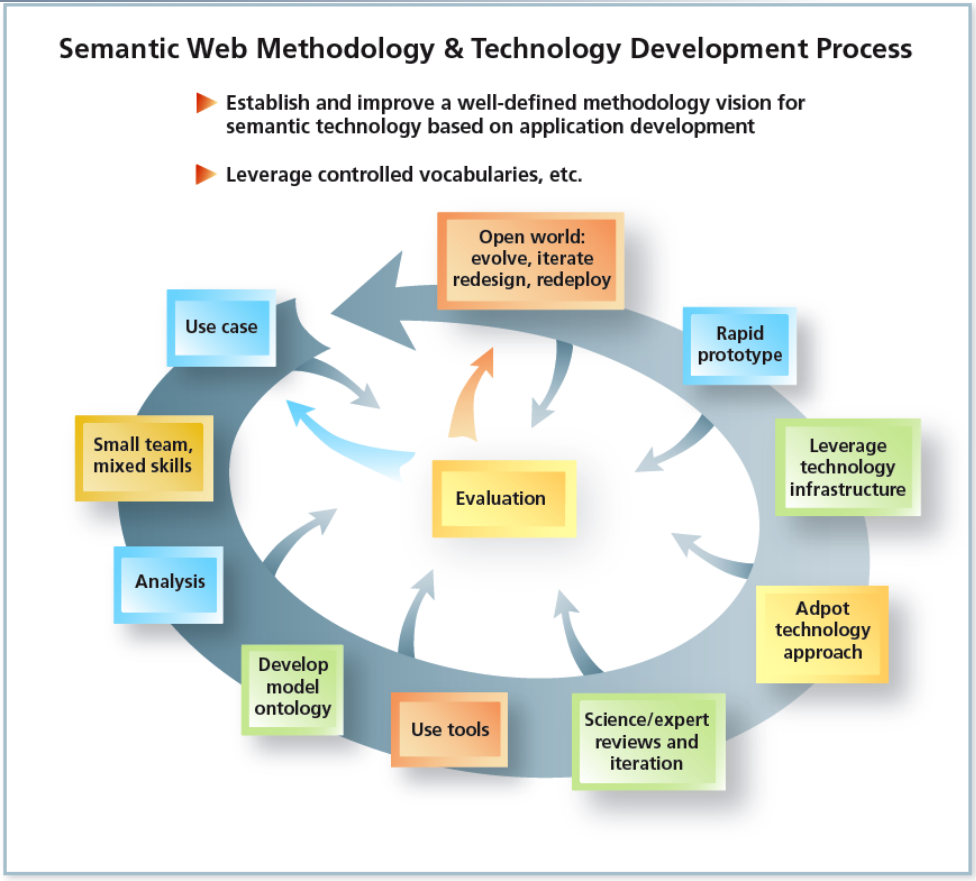
Beginnings: Where it all started

In Woods Hole in 2011, at the first use case meeting, the idea of a tool that could return to a researcher a number of images and/or videos based on erosion values for the coastline, for a multiple coastal locations, was conceived.

That turned out to be a bit much

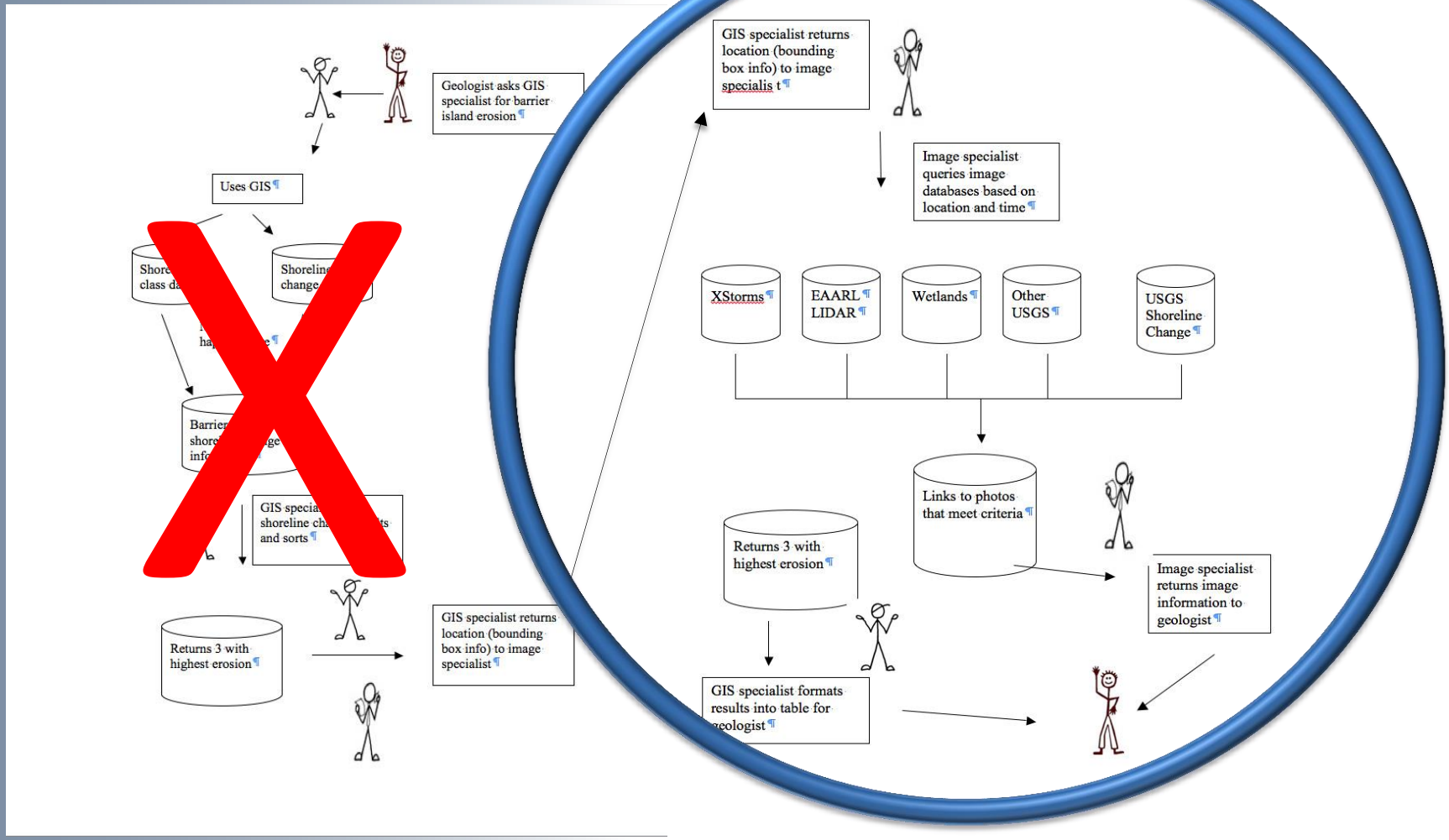


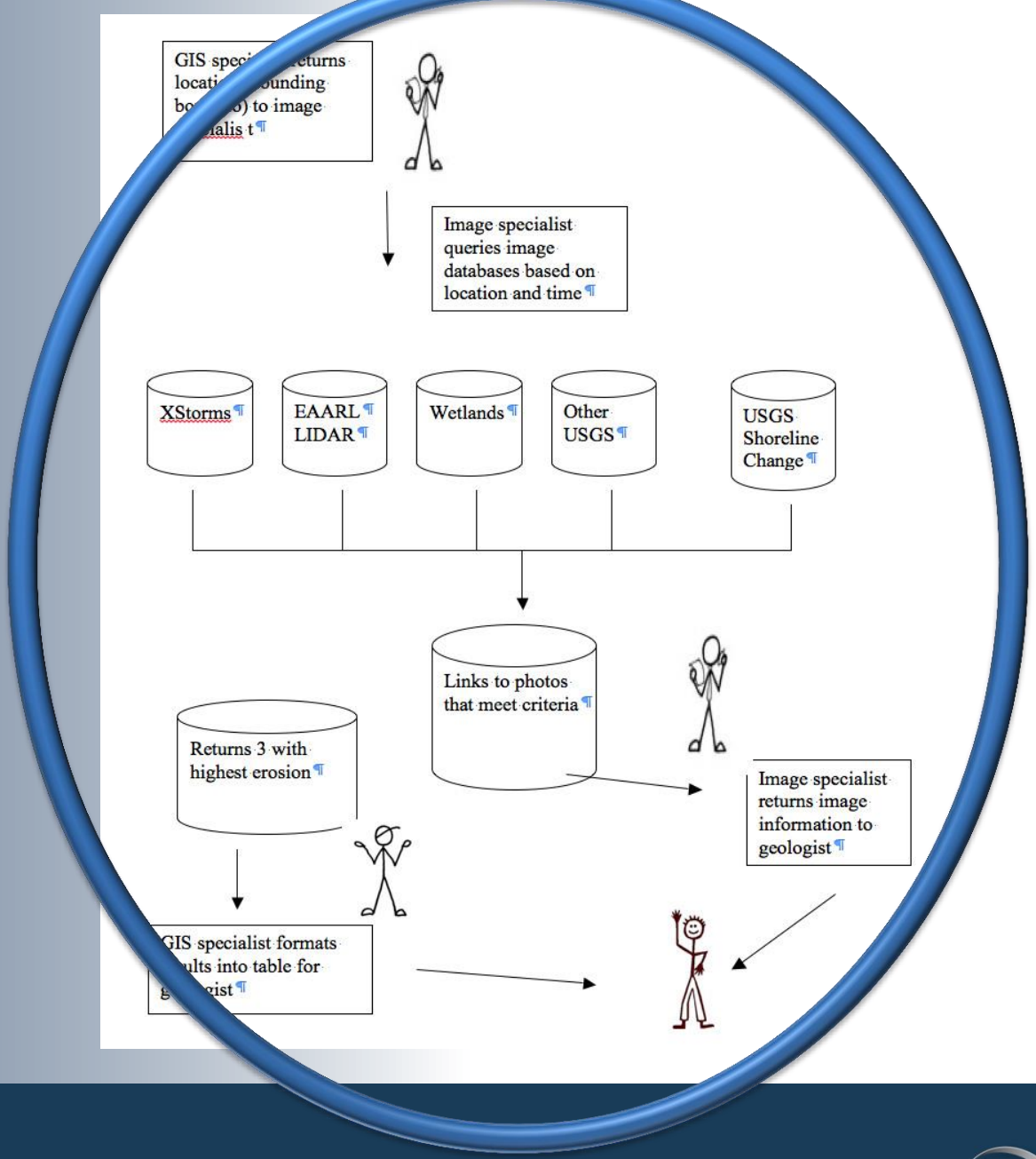
Use Cases are all about iterations… And at that point, no done any development.



So they took a step back, called myself and another person in as an image specialists and rethought the process.

Instead of trying to have the tool determine where the erosion was greatest, we decided that the user could pick a location they were interested in, pass that information onto the image specialist, and get images returned to them.


Geologist asks GIS specialist for barrier island erosion
Uses GIS
Returns 3 with highest erosion
GIS specialist returns location (bounding box info) to image specialist
GIS specialist returns location (bounding box info) to image specialis t
Image specialist queries image databases based on location and time
XStorms
EAARL LIDAR
Wetlands
Other USGS
USGS Shoreline Change
Links to photos that meet criteria
Returns 3 with highest erosion
Image specialist returns image information to geologist
GIS specialist formats results into table for


GIS specialist returns location bounding box to image analist
Image specialist queries image databases based on location and time
XStorms
EAARL LIDAR
Wetlands
Other USGS
USGS Shoreline Change
Links to photos that meet criteria
Returns 3 with highest erosion
Image specialist returns image information to geologist
GIS specialist formats results into table for geologist

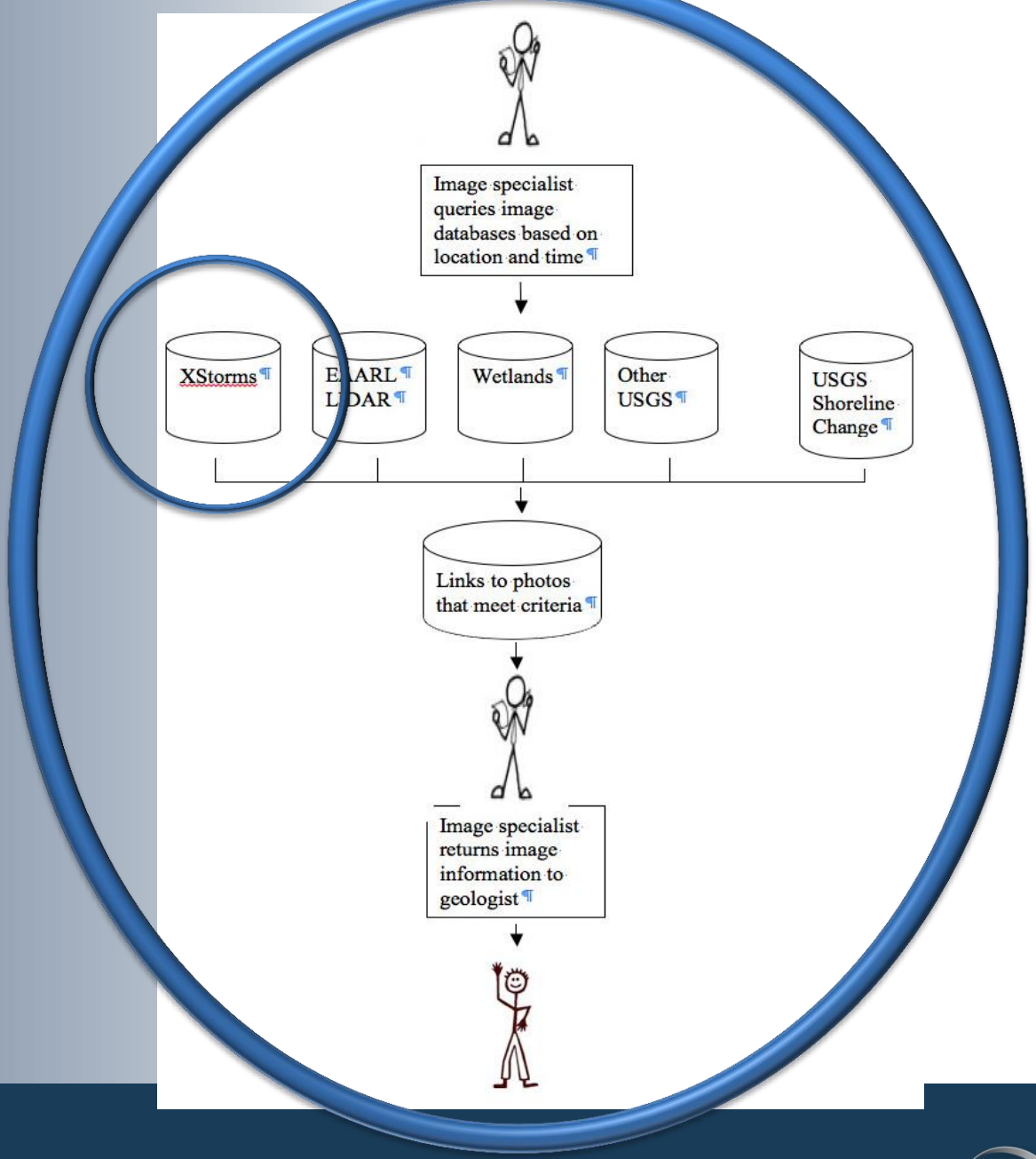
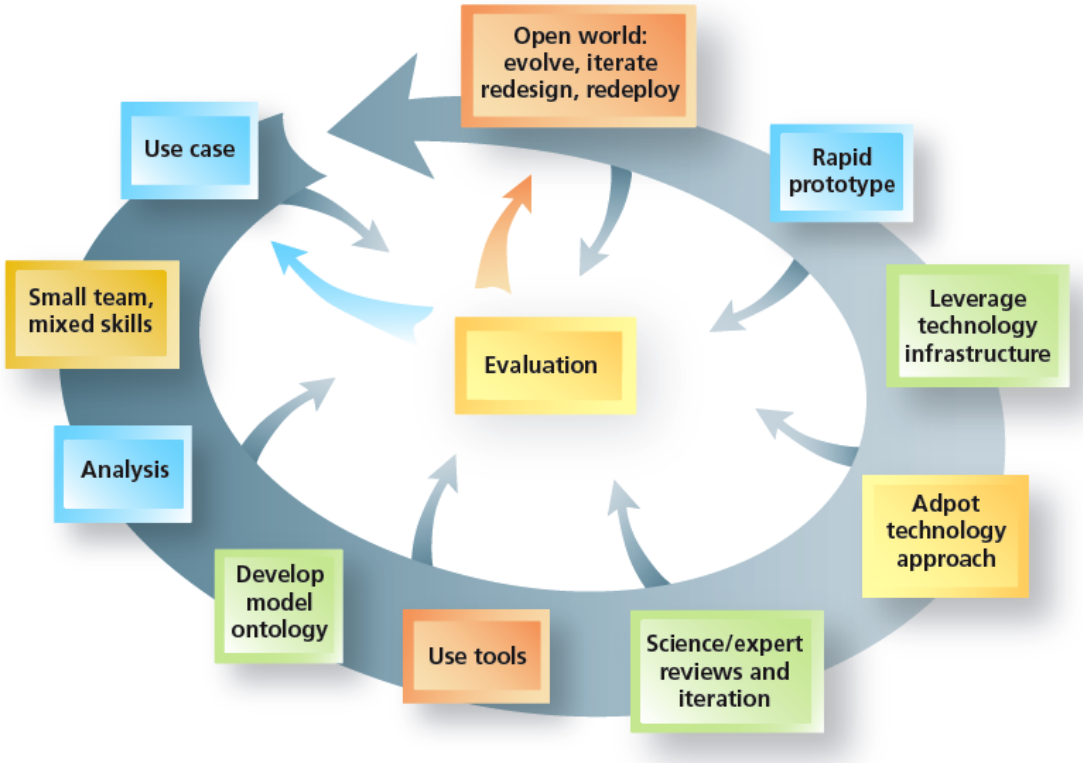


Image specialist queries image databases based on location and time
XStorms
EAARL LIDAR
Wetlands
Other USGS
USGS Shoreline Change
Links to photos that meet criteria
Image specialist returns image information to geologist

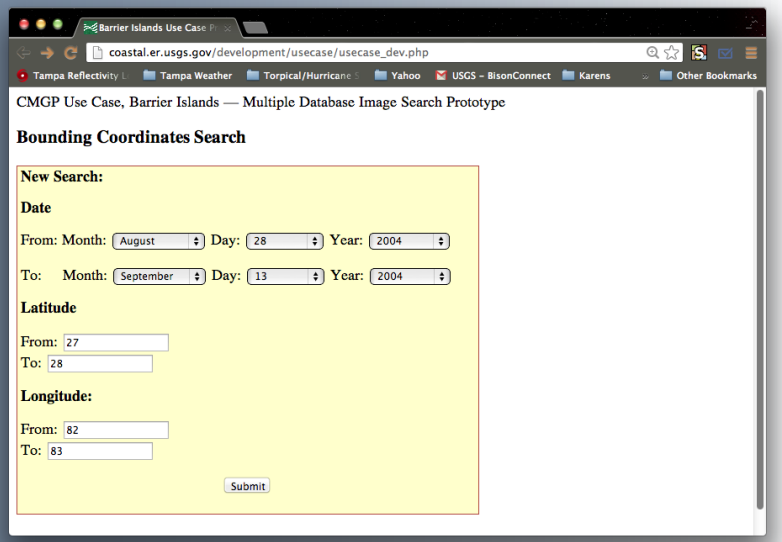
Semantic Web Methodology & Technology Development Process

- Establish and improve a well-defined methodology vision for semantic technology based on application development
- Leverage controlled vocabularies, etc.



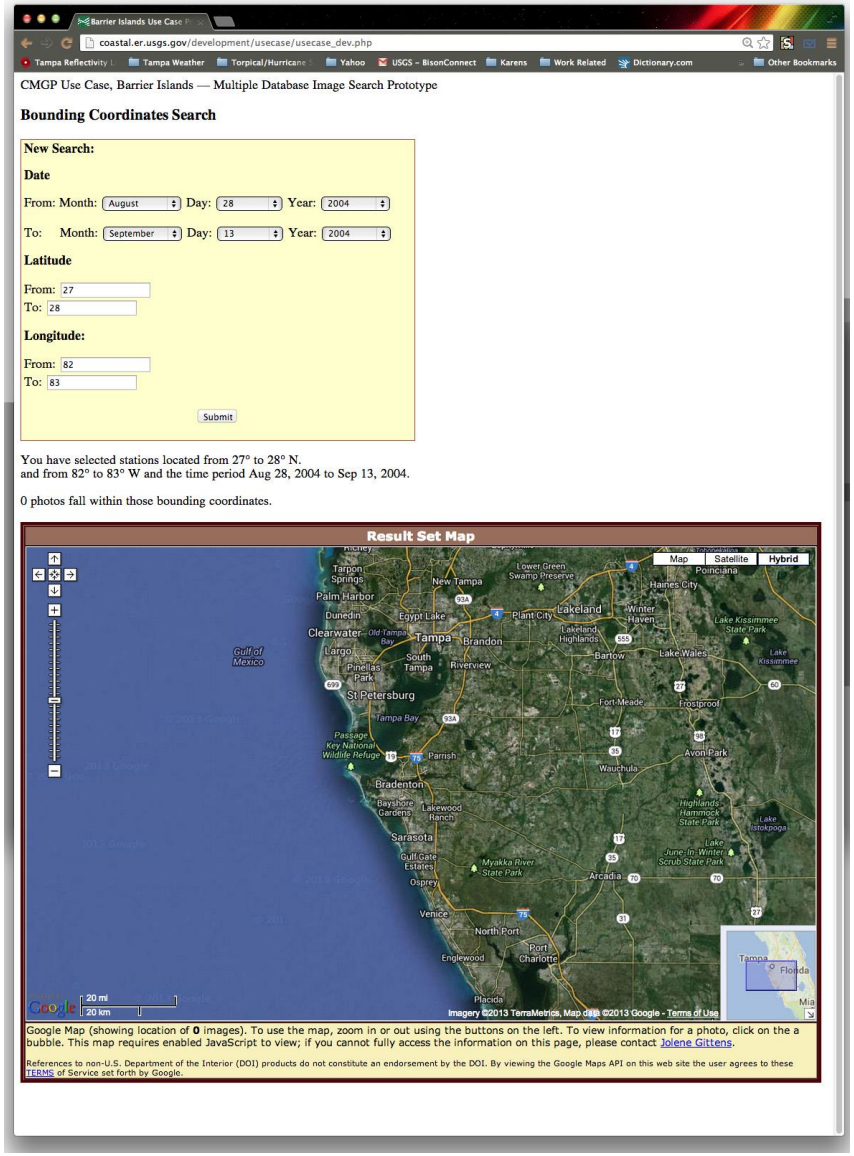
Version 1:

Pretty Plain



On to the Evaluation Stage.

More discussions, suggestions and ideas



Version 2:

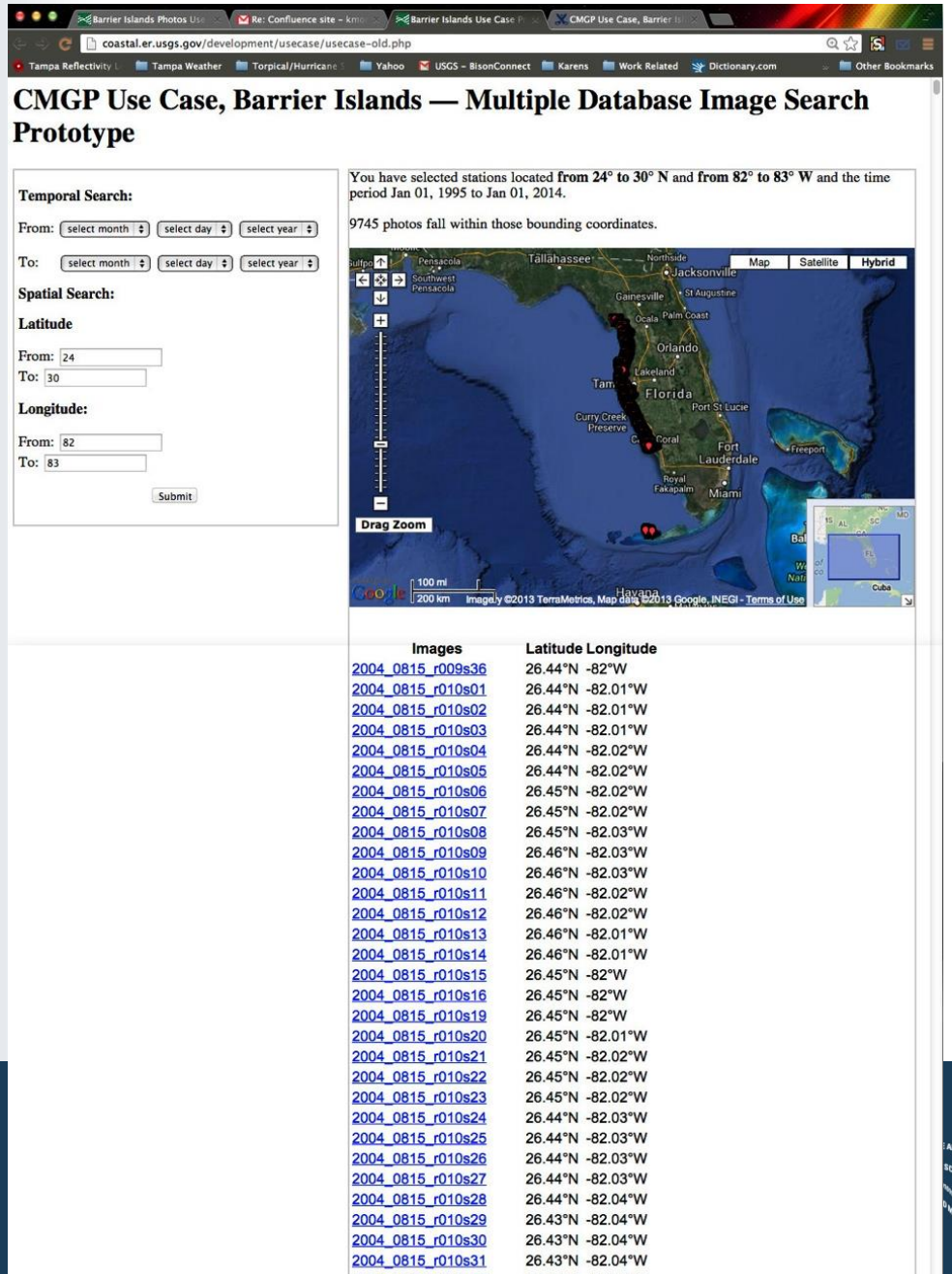
Added zoom tool, when and where you were looking, and a list of the images shown.

Back to the Evaluation Stage.

More discussions,

more suggestions,

more ideas

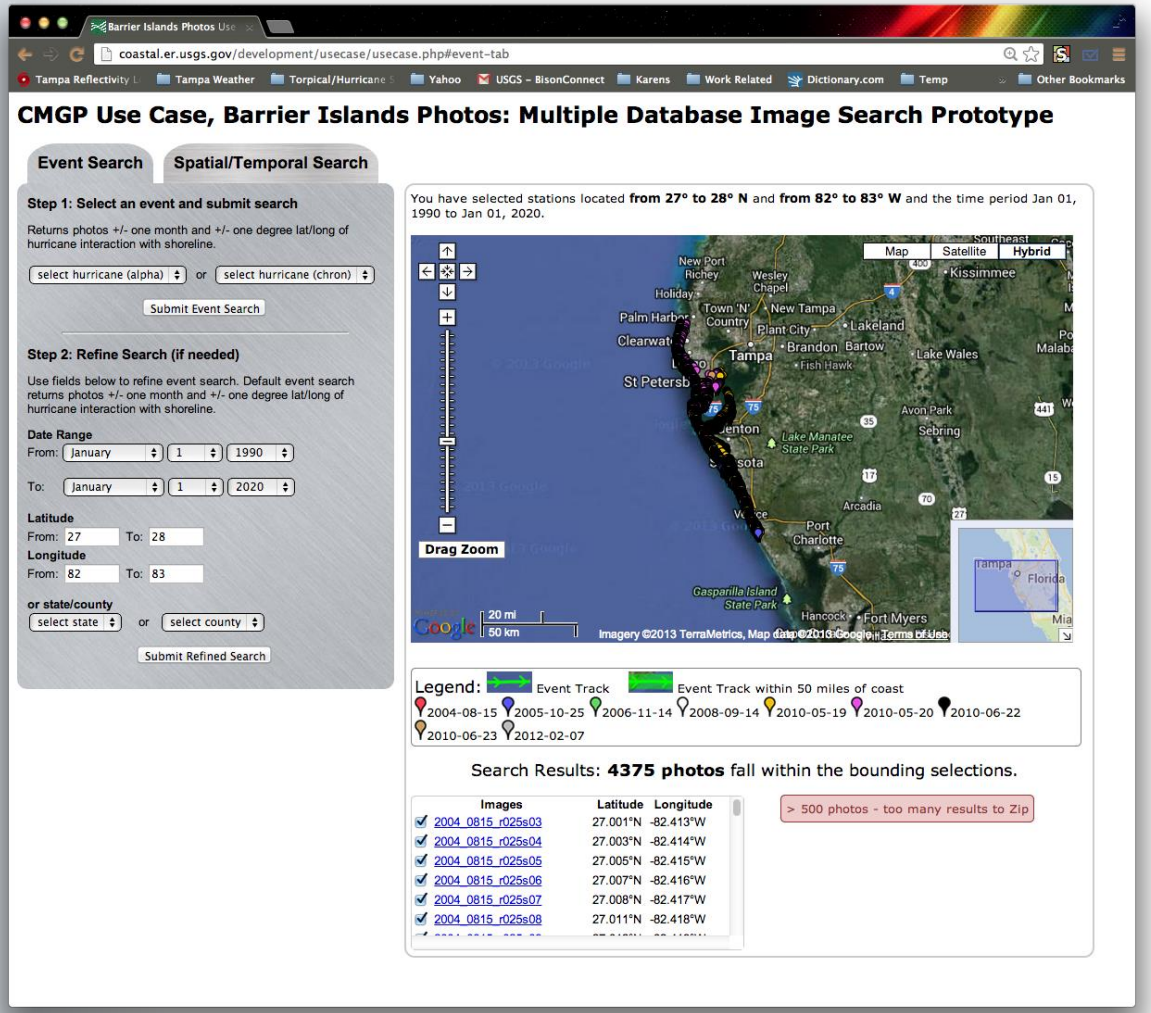


Current Prototype:

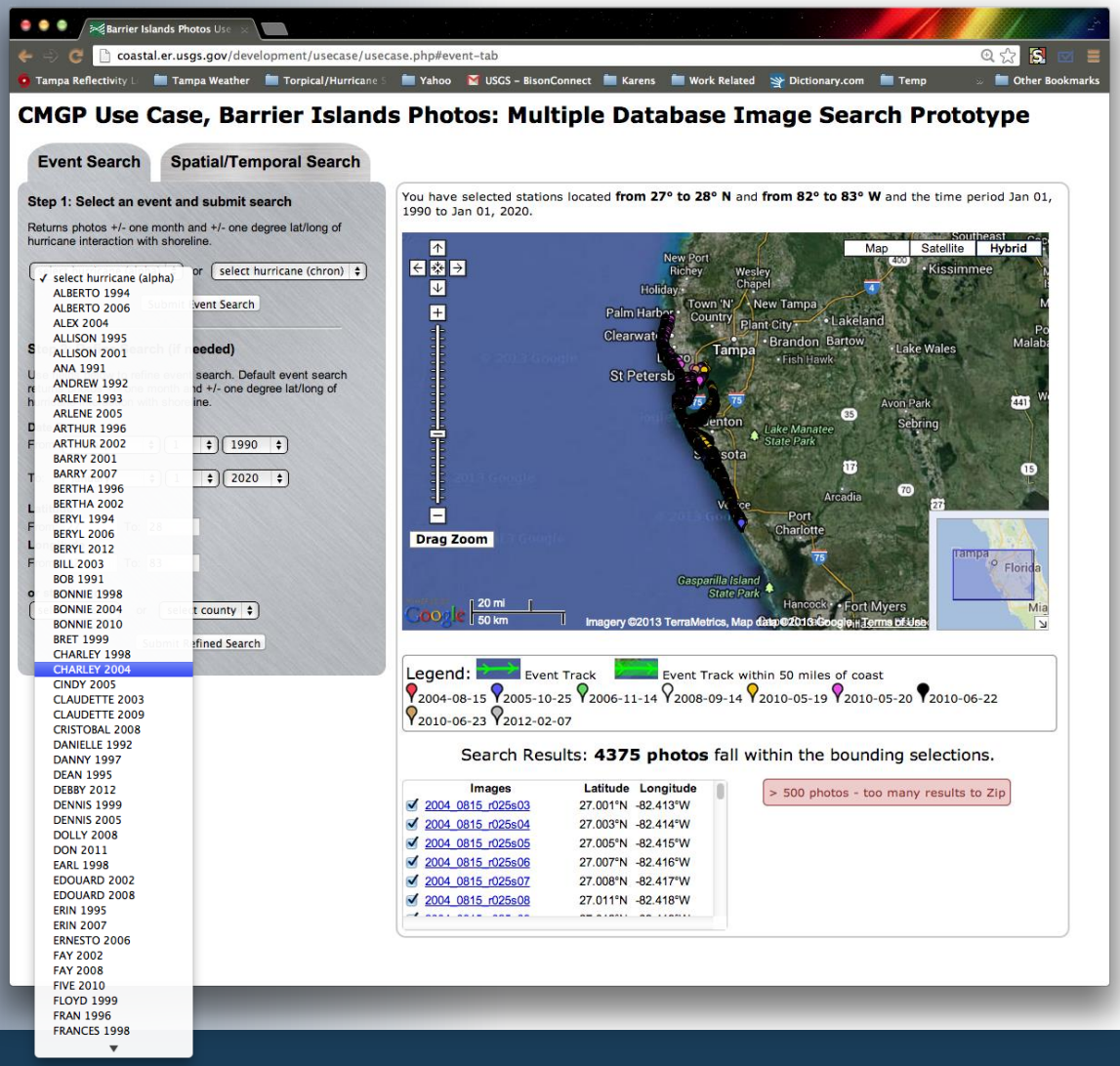
Version 3

Neater, cleaner, clearer…

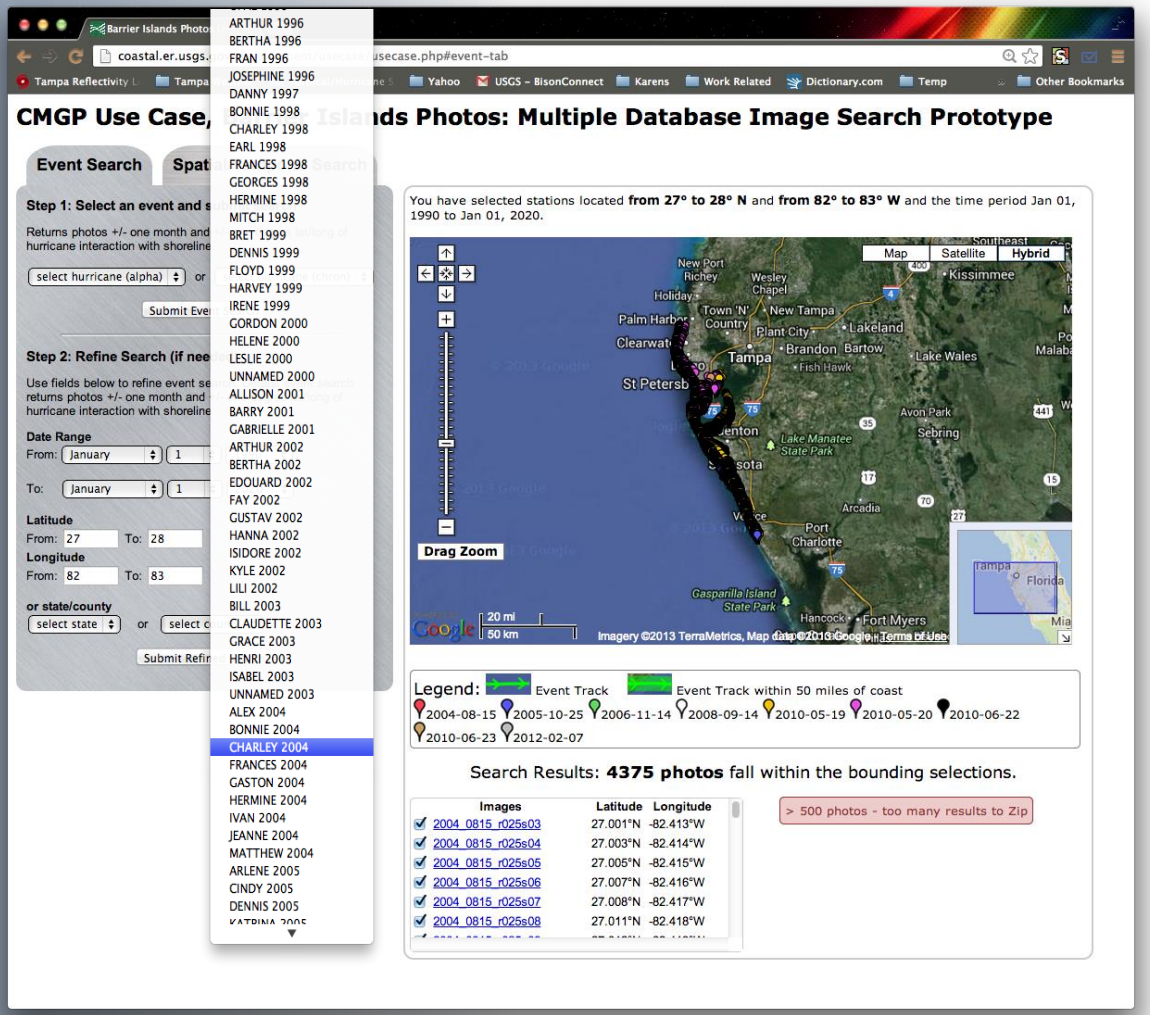
and still evolving.



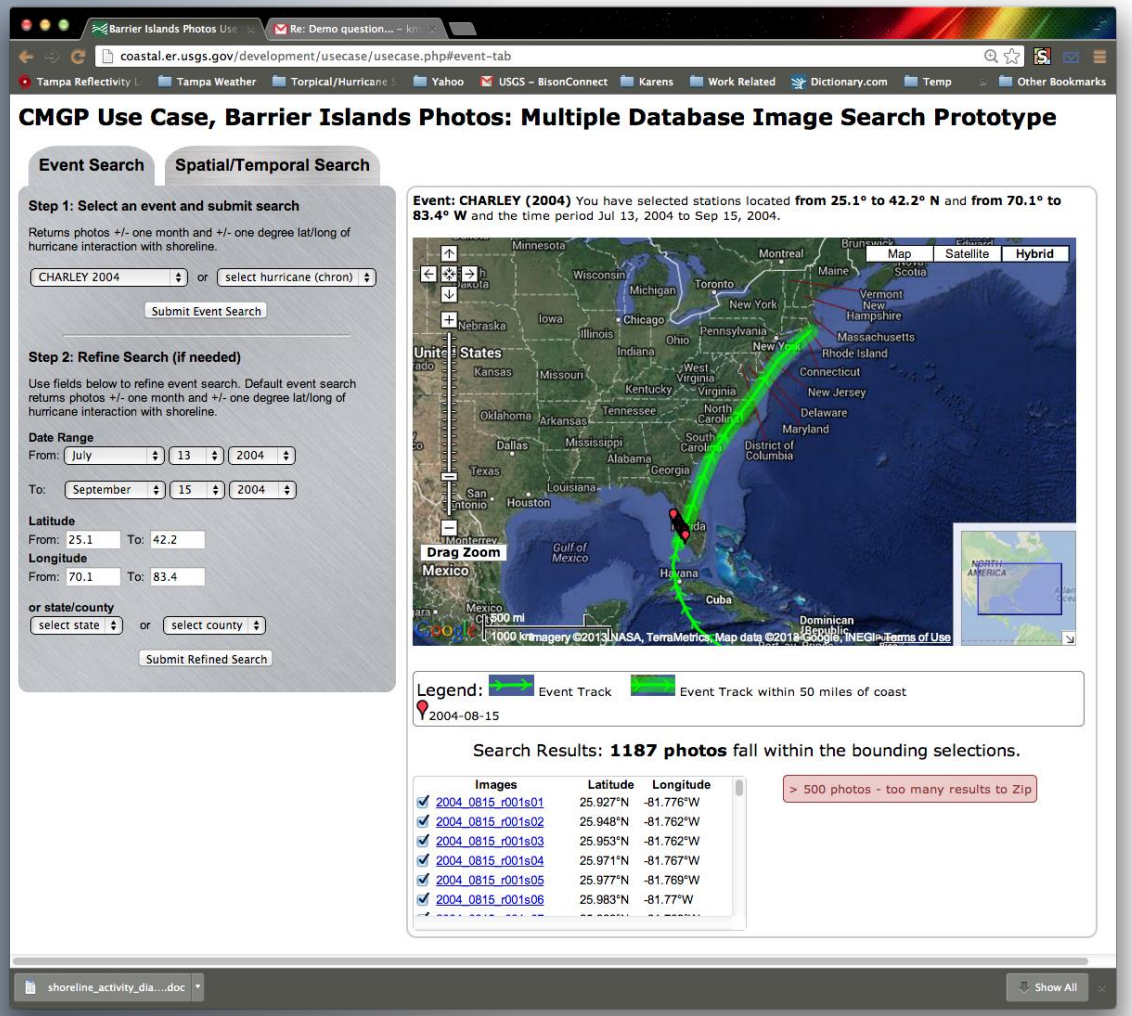
Event Search: Alphabetically



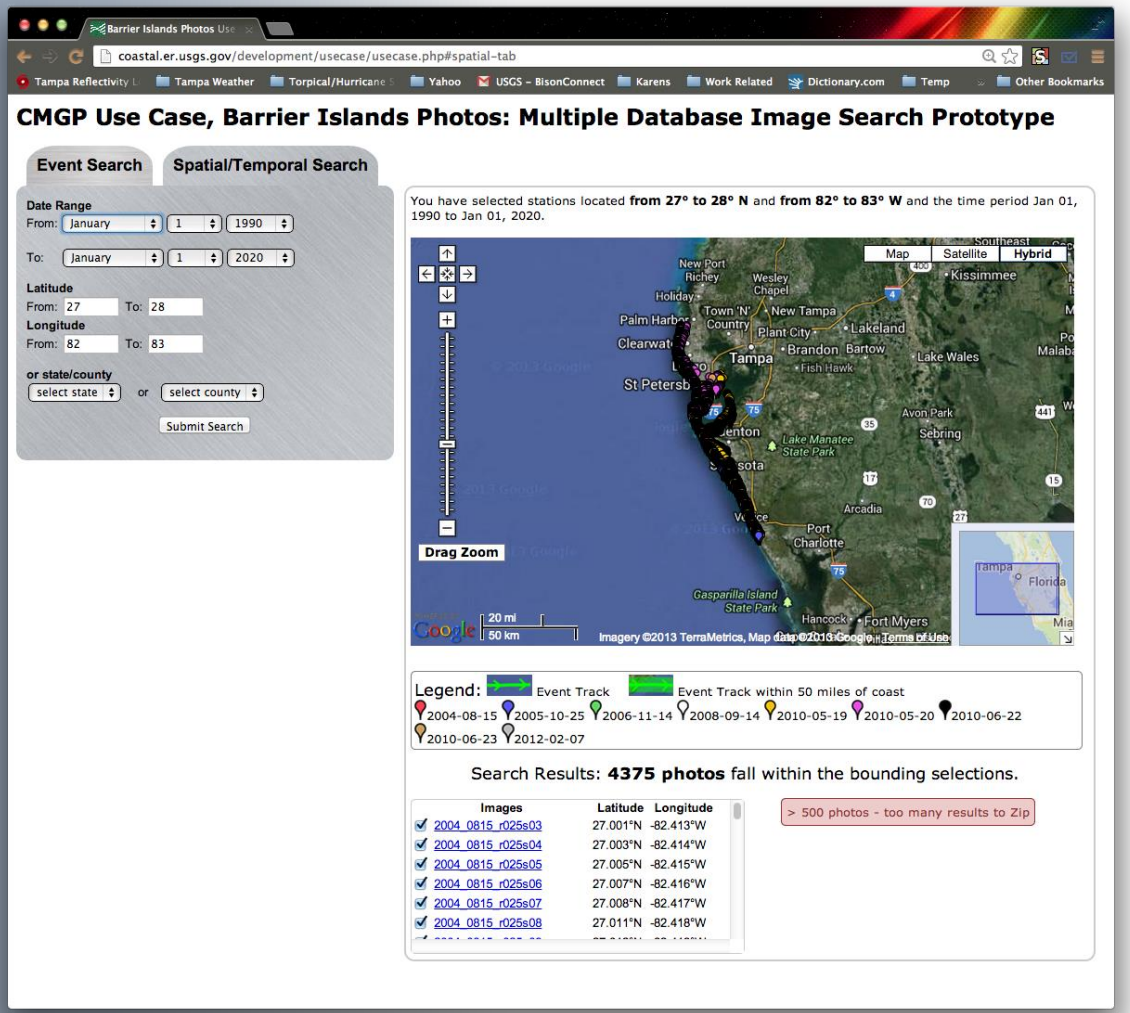
Event Search: Chronologically



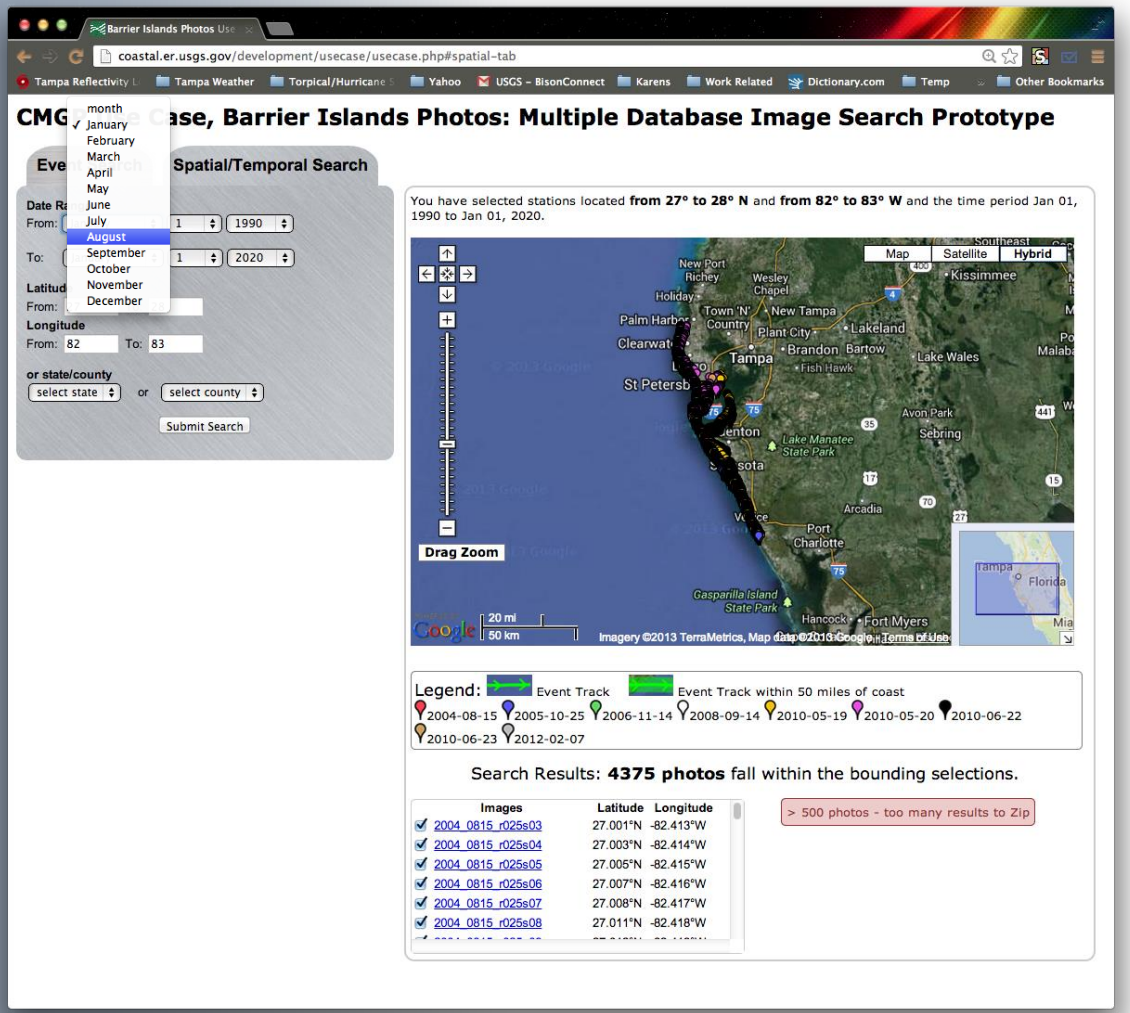
Refine search by entering lat/long values



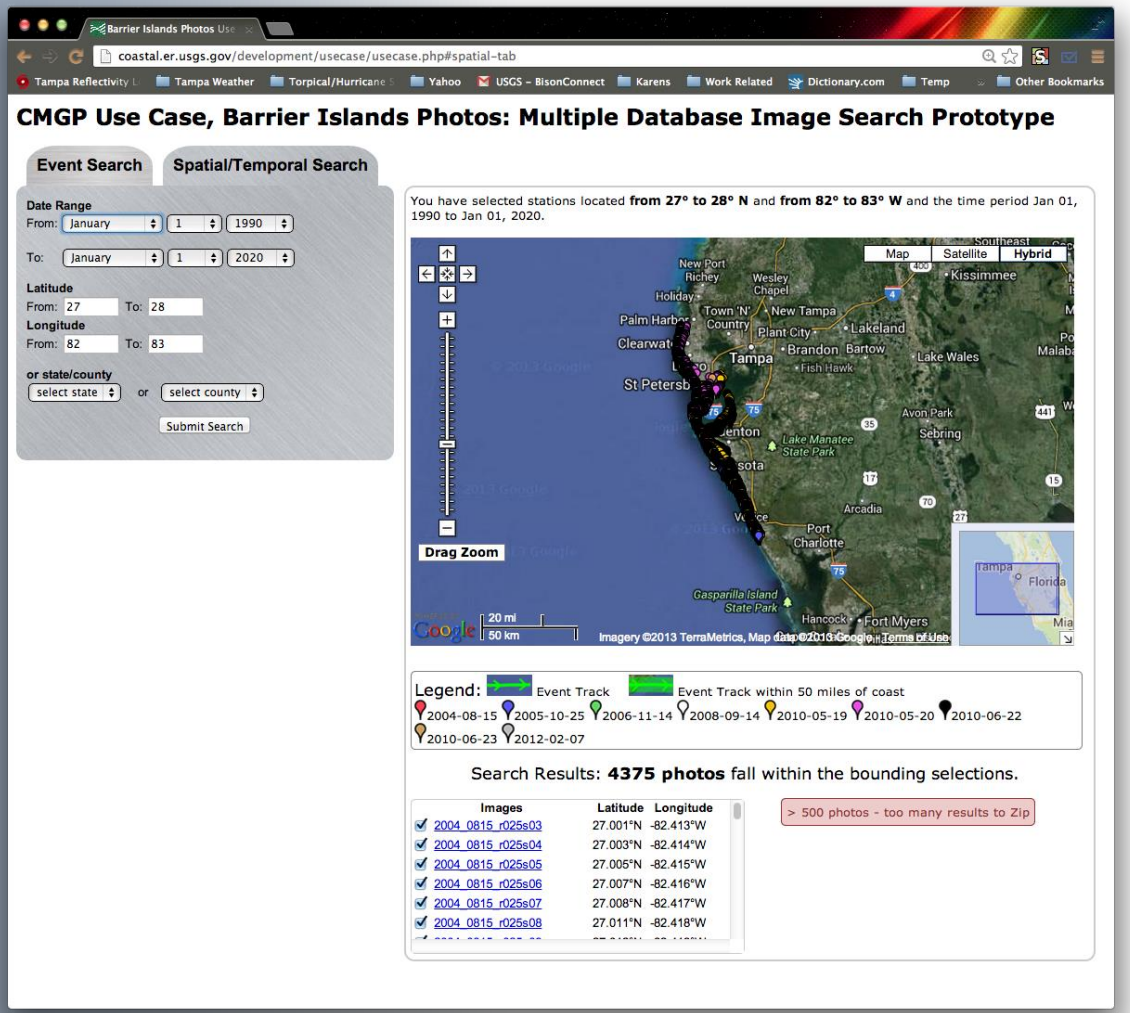
Spatial/Temporal Search:



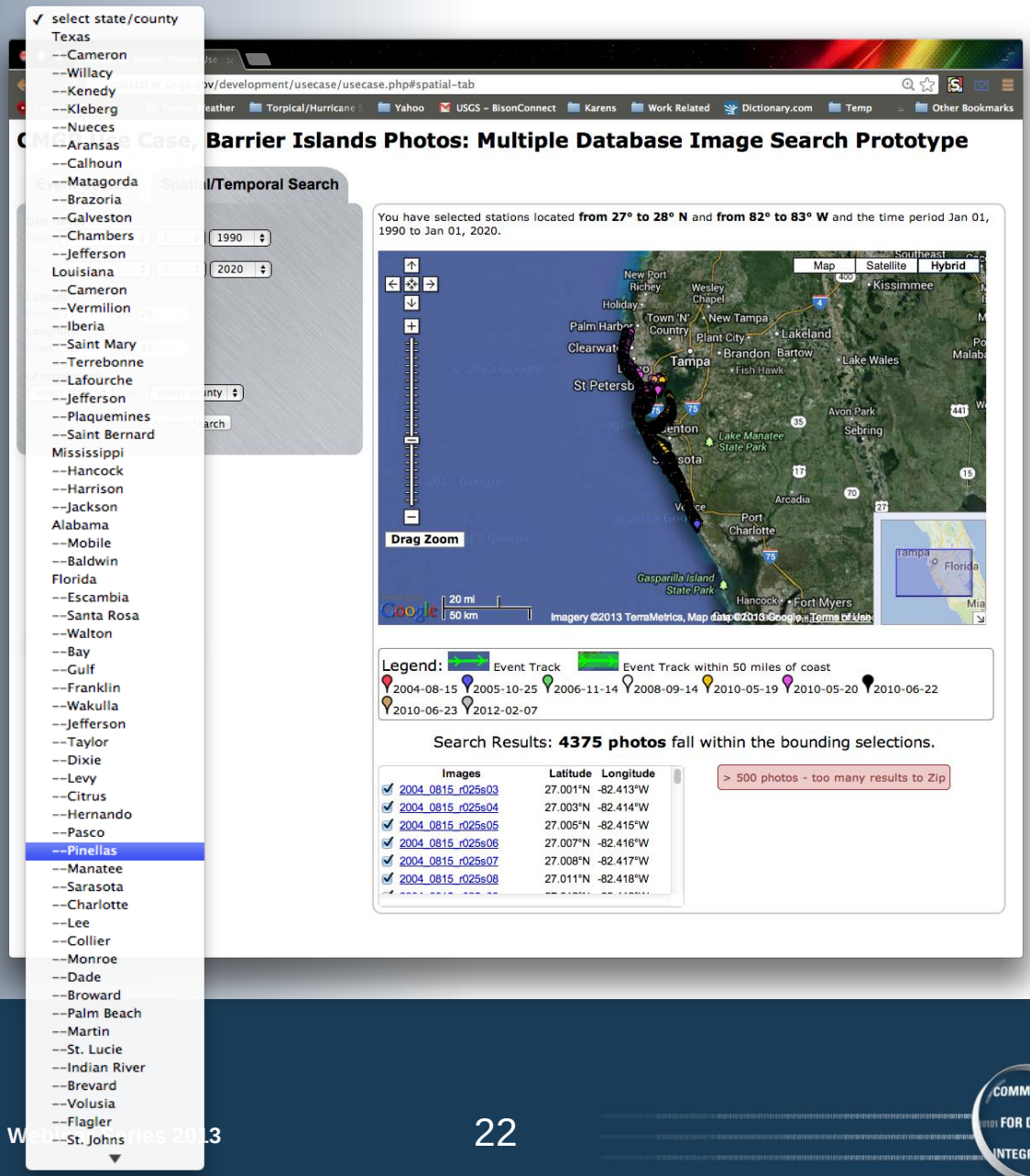
Spatial/Temporal Search: Select a month day and year



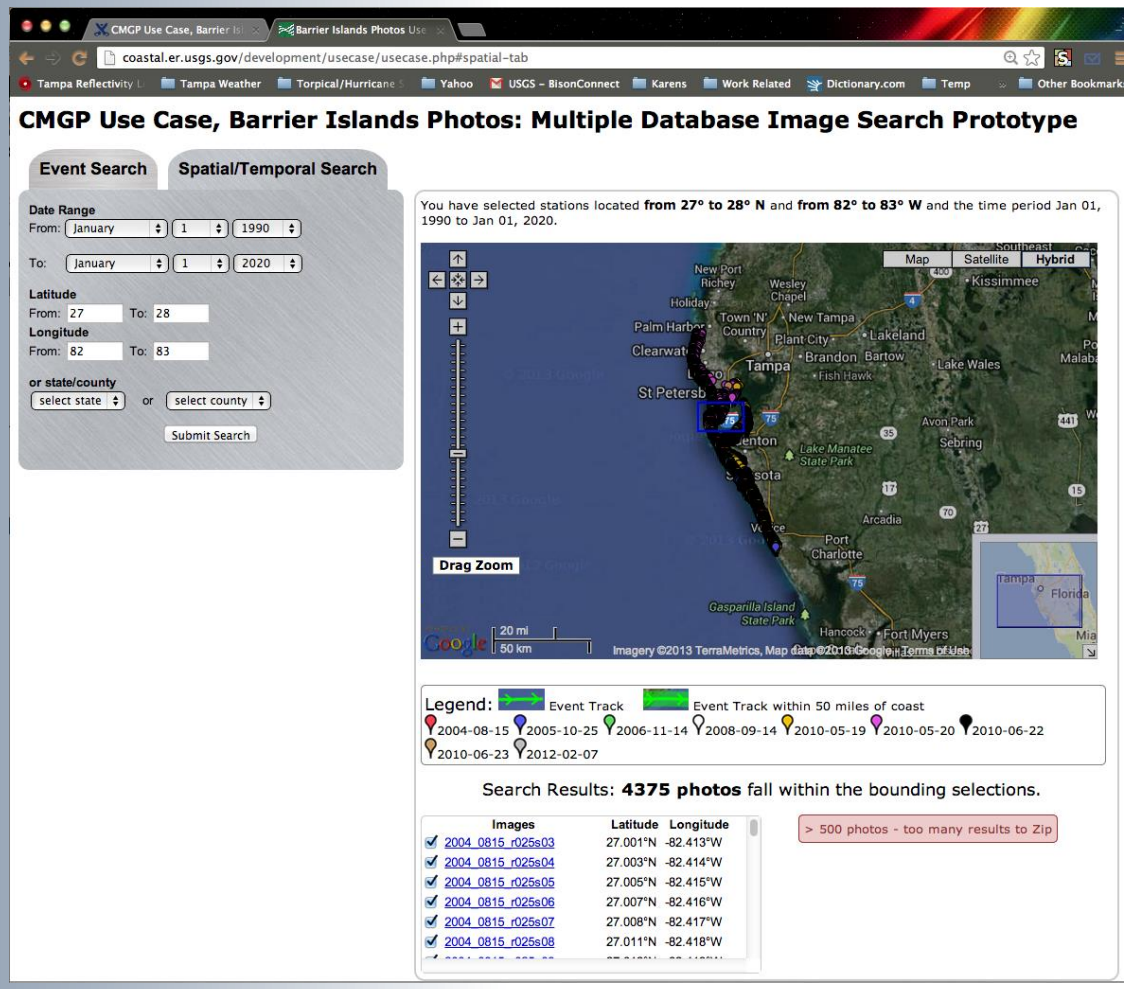
Spatial/Temporal Search: Enter a Lat/Long



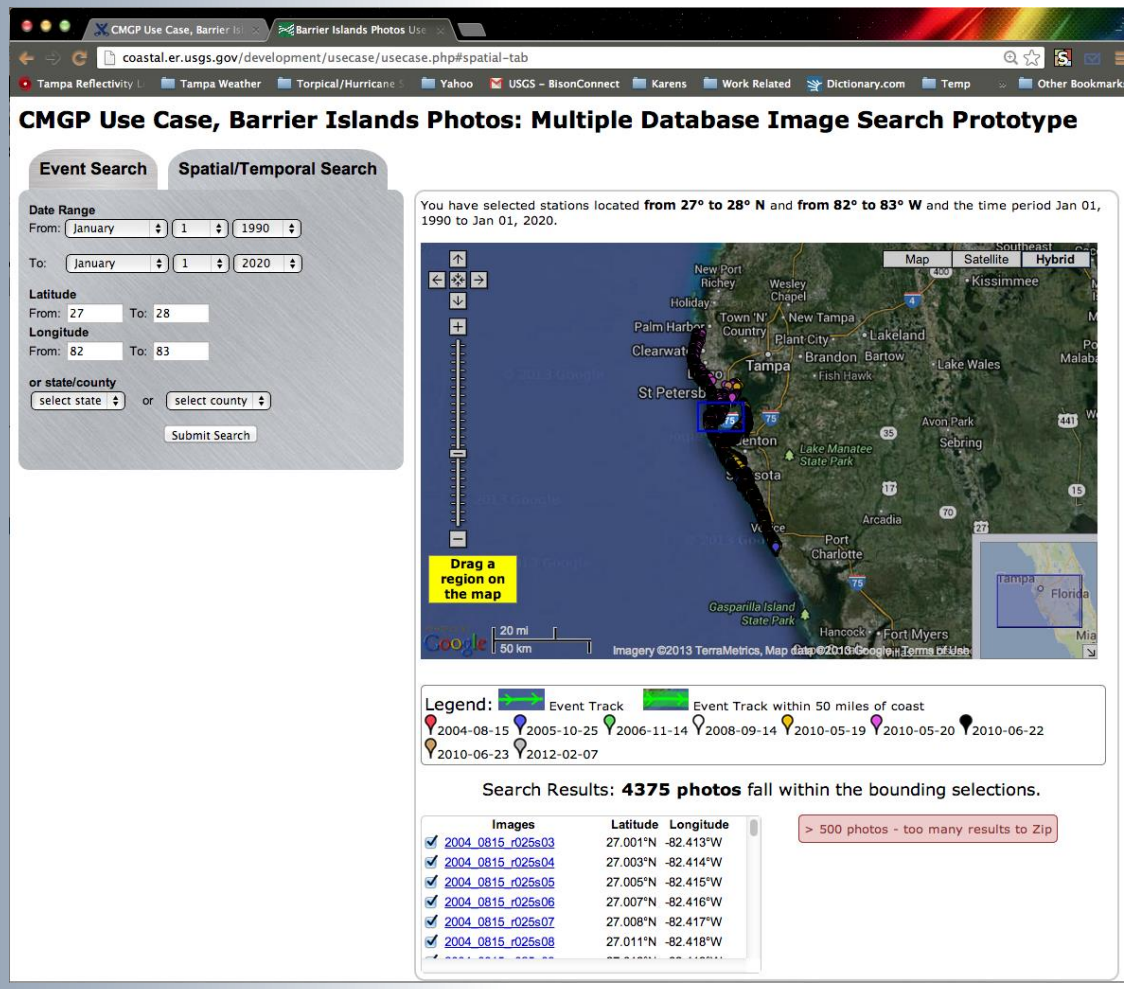
Spatial/Temporal Search: Select a State & County



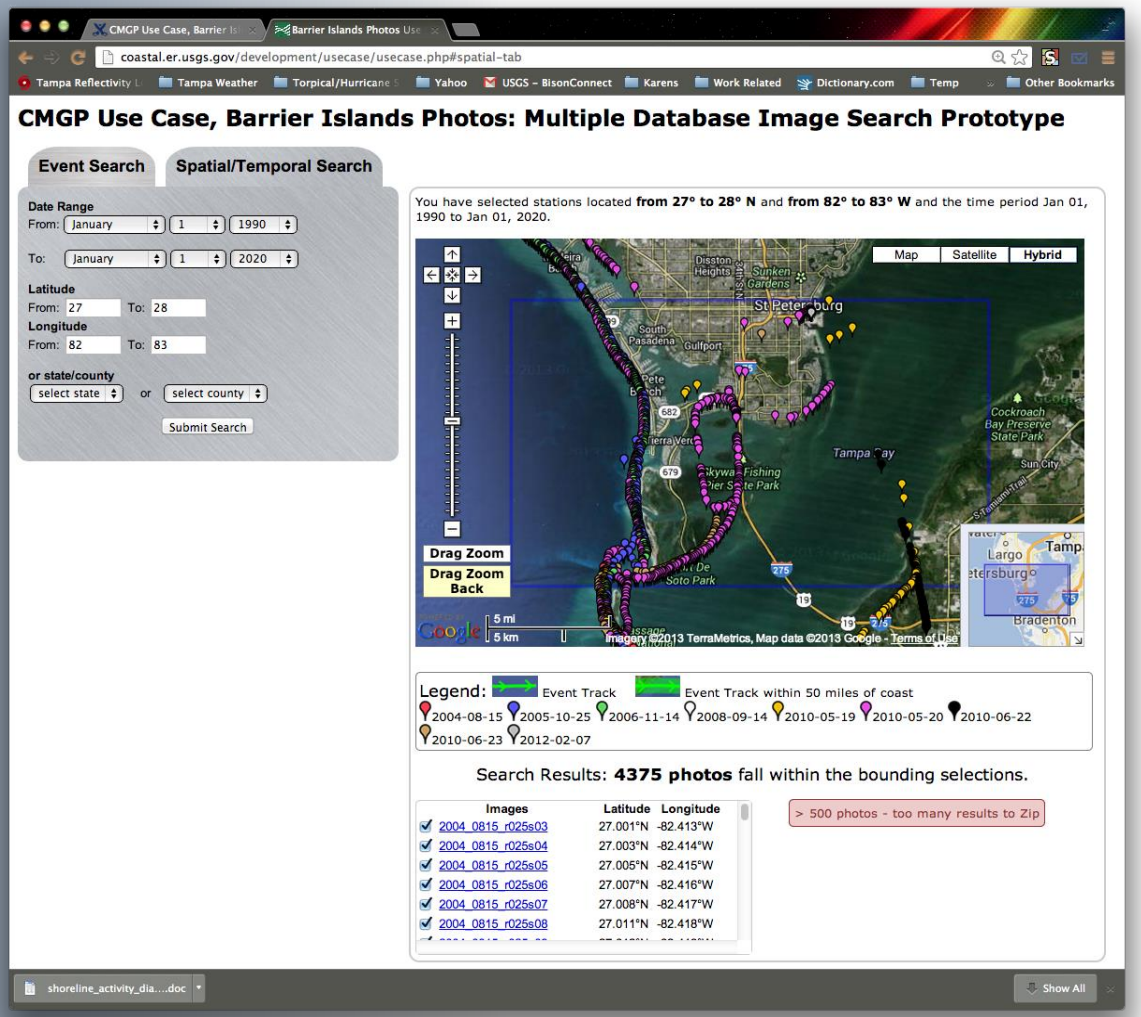
Zoom Tool: Click and Drag



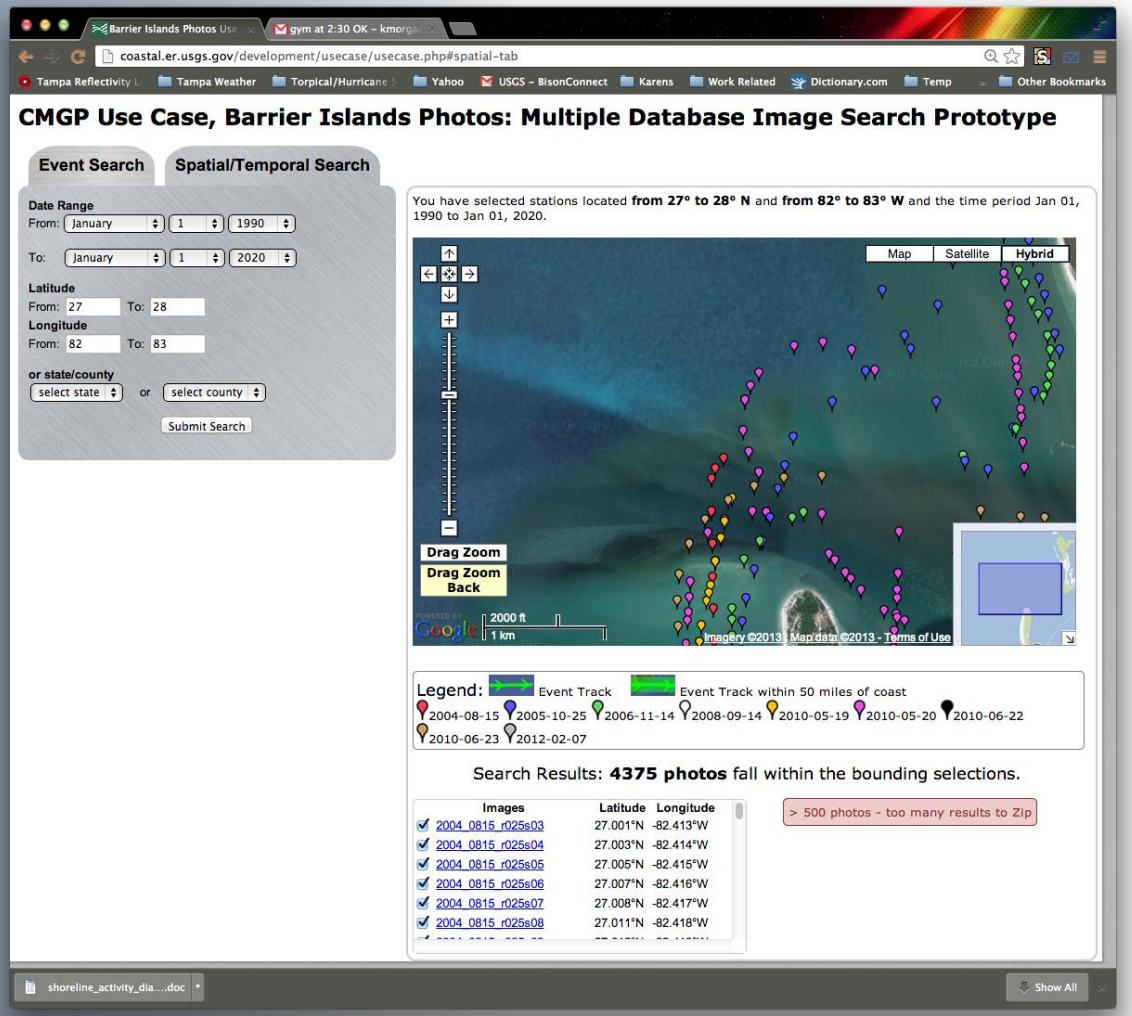
Zoom Tool: Click and Drag



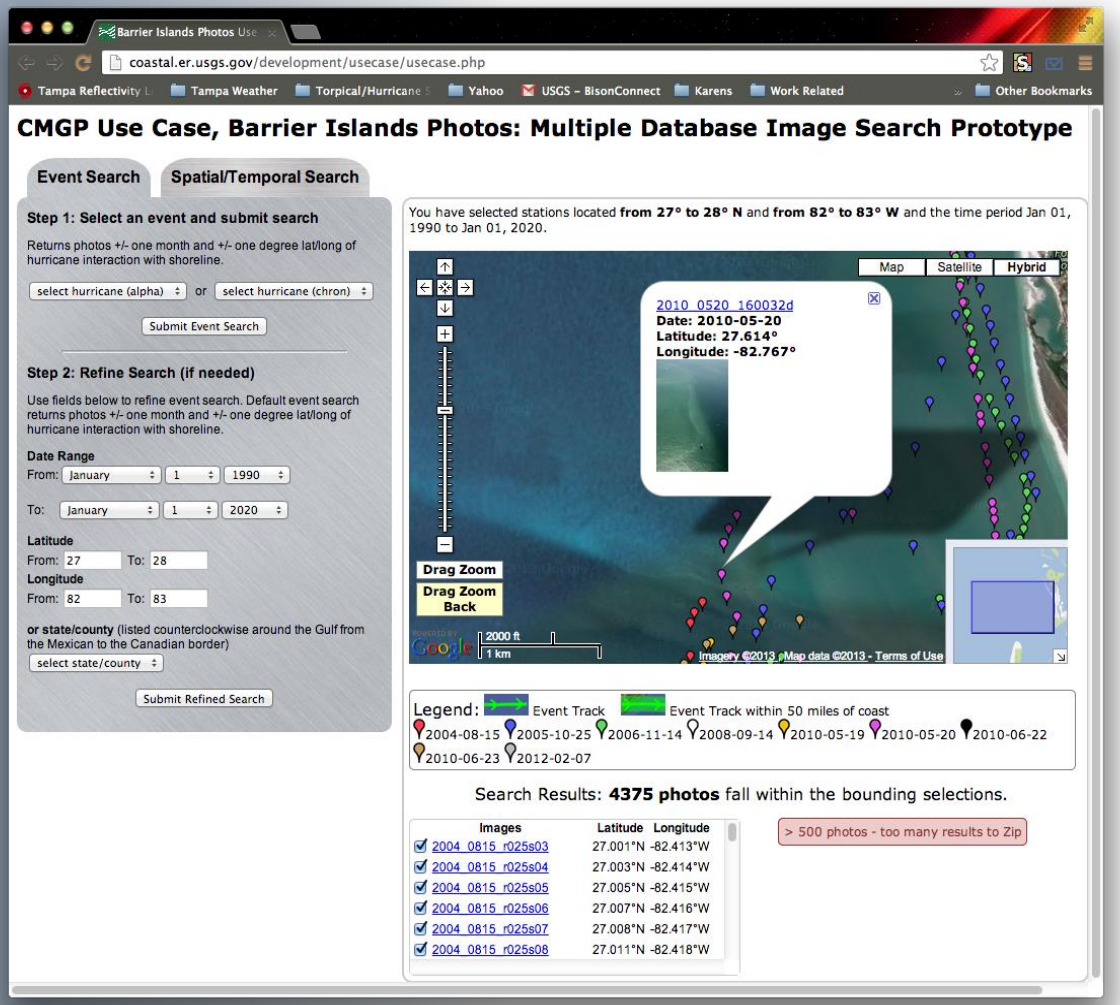
Zoom Tool: Click and Drag



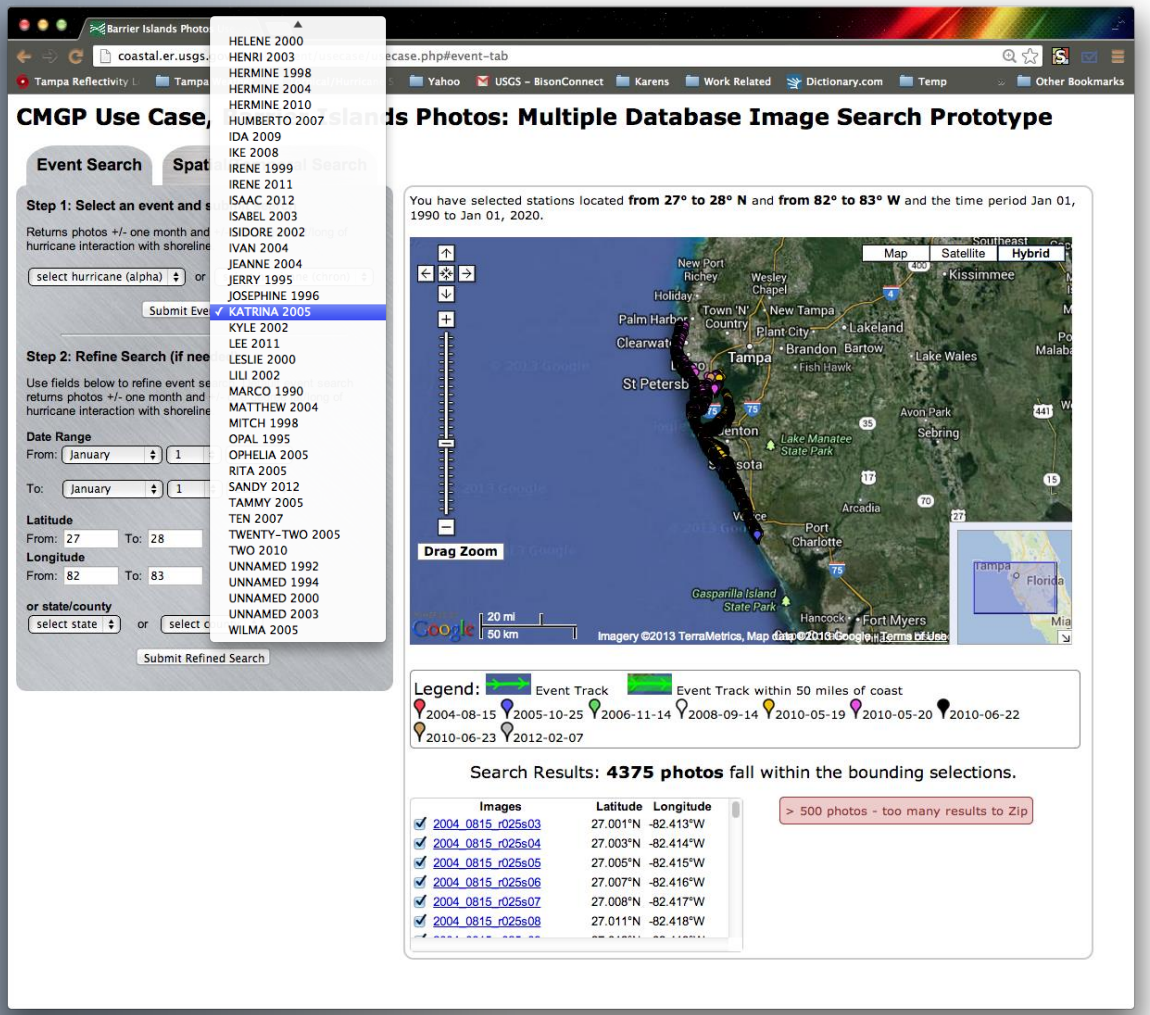
View thumbnails



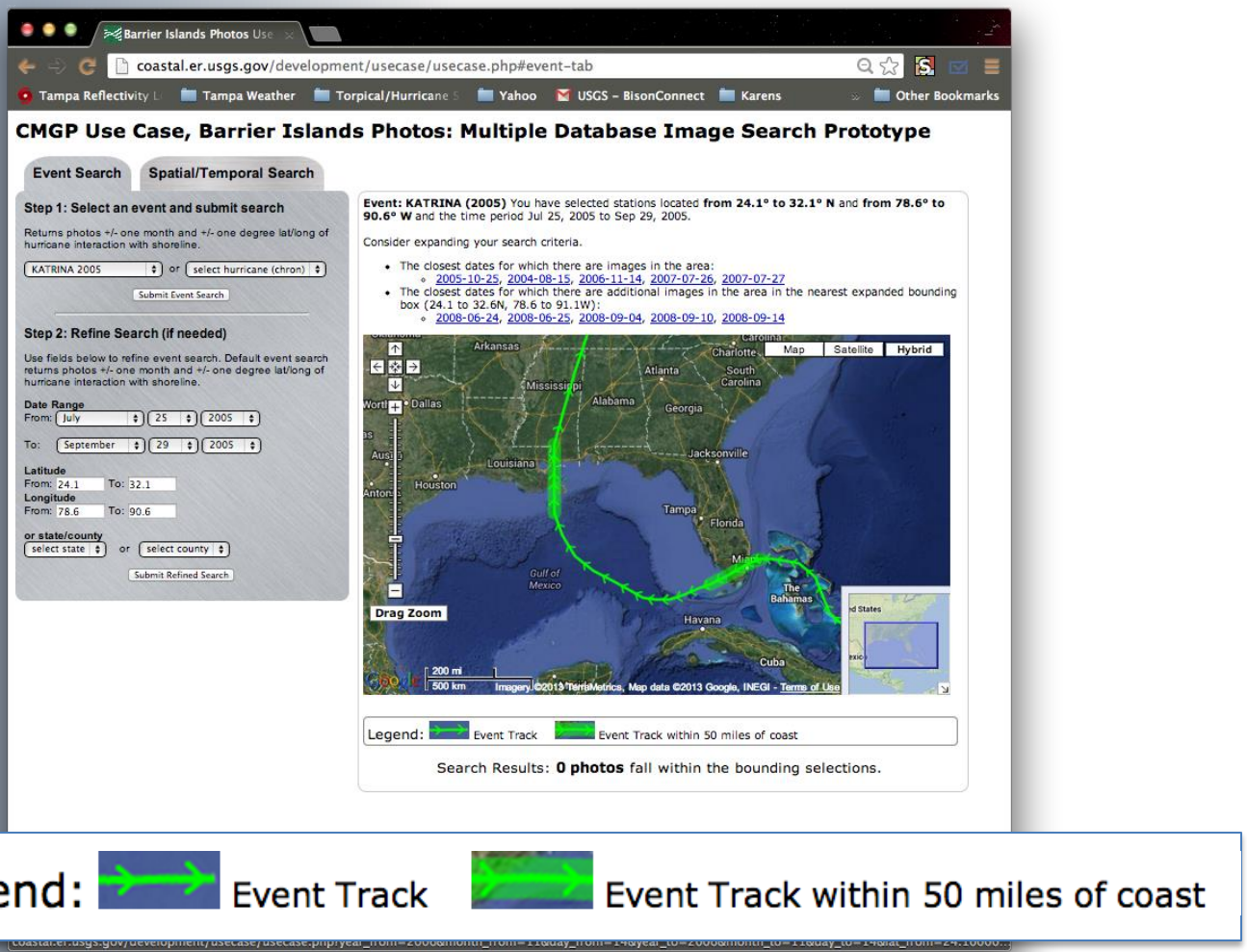
View thumbnails



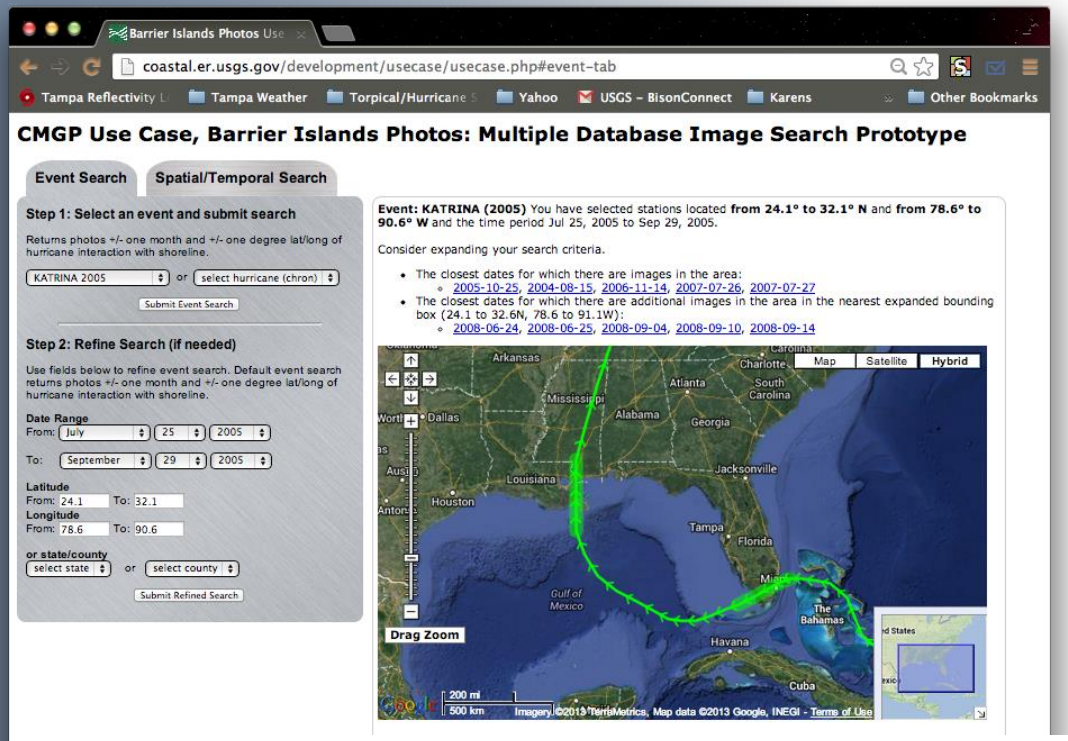
Storm Tracks & Data



Storm Track: Katrina



Track data: http://weather.unisys.com/hurricane/index.php

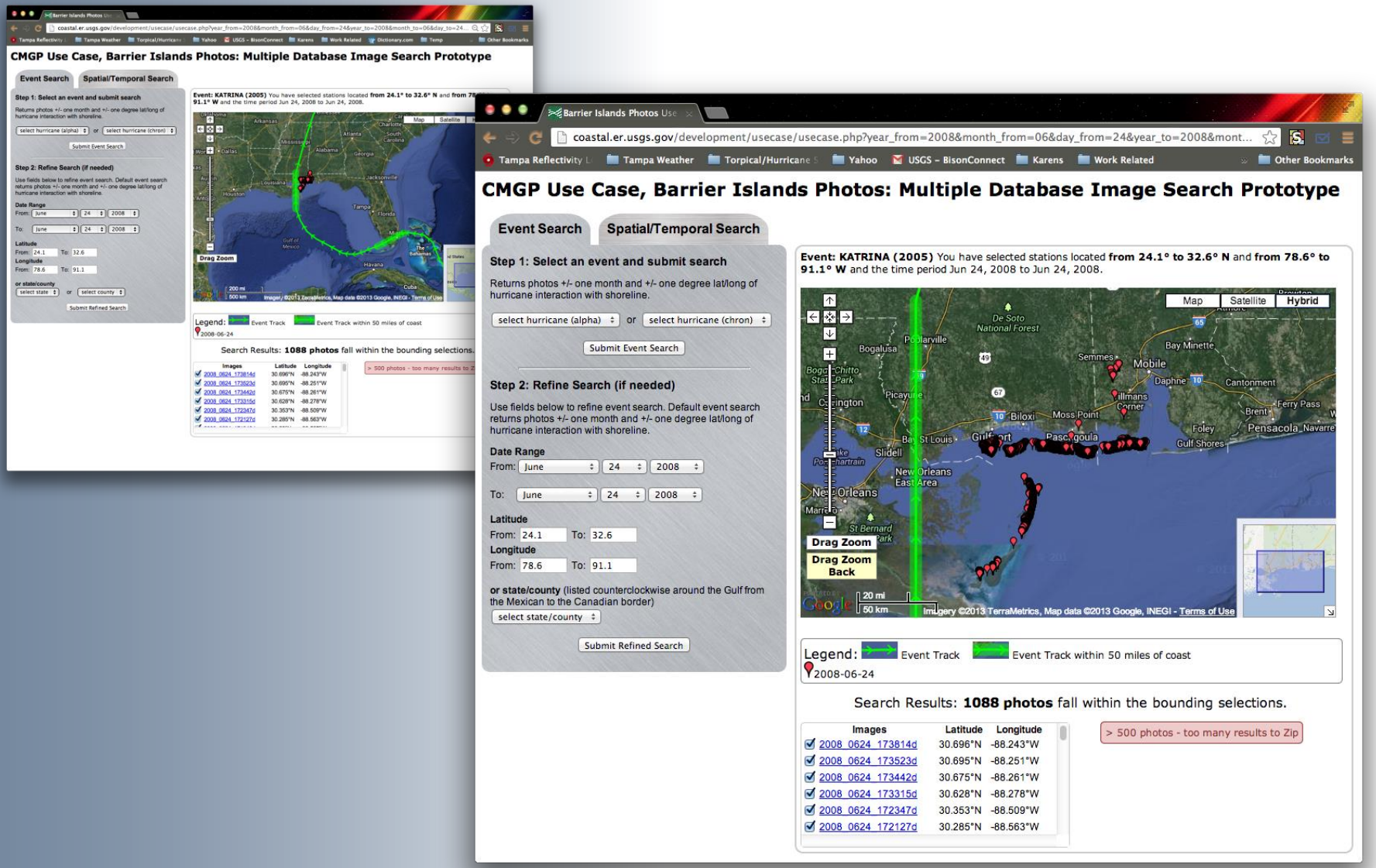


If there are no images to match your search, the tool will offer a list of other possible dates from which to choose.

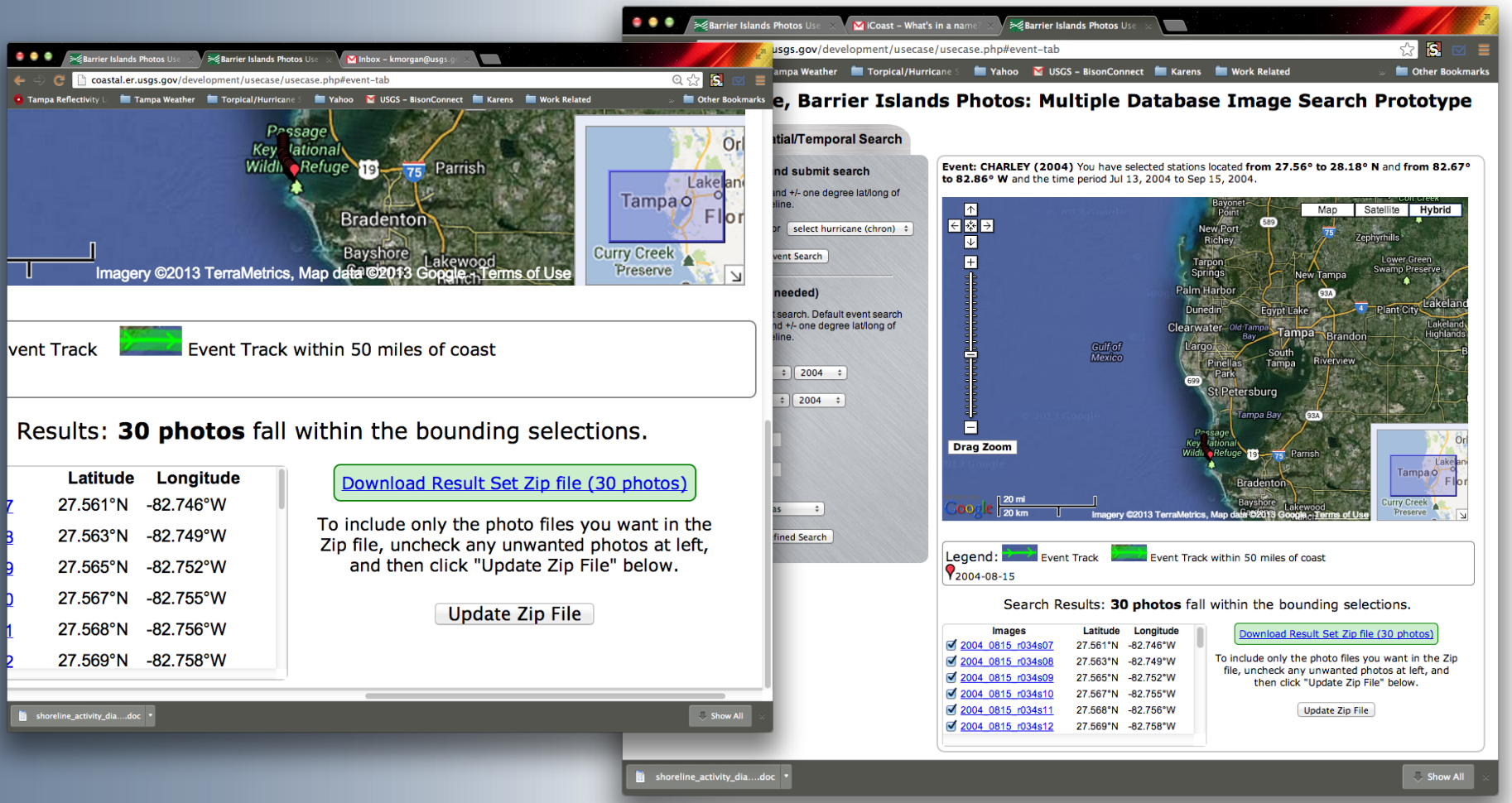
Event: KATRINA (2005) You have selected stations located **from 24.1° to 32.1° N** and **from 78.6° to 90.6° W** and the time period Jul 25, 2005 to Sep 29, 2005.

Consider expanding your search criteria.

- The closest dates for which there are images in the area:
  - 2005-10-25, 2004-08-15, 2006-11-14, 2007-07-26, 2007-07-27
- The closest dates for which there are additional images in the area in the nearest expanded bounding box (24.1 to 32.6N, 78.6 to 91.1W):
  - 2008-06-24, 2008-06-25, 2008-09-04, 2008-09-10, 2008-09-14


Barrier Islands Photos Use
coastal.er.usgs.gov/development/usecase/usecase.php?year_from=2008&month_from=06&day_from=24&year_to=2008&mont...
Tampa Reflectivity
Tampa Weather
Torpical/Hurricane
Yahoo
USGS – BisonConnect
Karens
Work Related
Other Bookmarks
CMGP Use Case, Barrier Islands Photos: Multiple Database Image Search Prototype
Event Search
Spatial/Temporal Search
Step 1: Select an event and submit search
Returns photos +/- one month and +/- one degree lat/long of hurricane interaction with shoreline.
select hurricane (alpha)
or
select hurricane (chron)
Submit Event Search
Step 2: Refine Search (if needed)
Use fields below to refine event search. Default event search returns photos +/- one month and +/- one degree lat/long of hurricane interaction with shoreline.
Date Range
From: June 24 2008
To: June 24 2008
Latitude
From: 24.1 To: 32.6
Longitude
From: 78.6 To: 91.1
or state/county (listed counterclockwise around the Gulf from the Mexican to the Canadian border)
select state/county
Submit Refined Search
Event: KATRINA (2005) You have selected stations located from 24.1° to 32.6° N and from 78.6° to 91.1° W and the time period Jun 24, 2008 to Jun 24, 2008.
Map
Satellite
Hybrid
Drag Zoom
Drag Zoom Back
Legend:
Event Track
Event Track within 50 miles of coast
2008-06-24
Search Results: 1088 photos fall within the bounding selections.
Images
Latitude
Longitude
2008_0624_173814d 30.696°N -88.243°W
2008_0624_173523d 30.695°N -88.251°W
2008_0624_173442d 30.675°N -88.261°W
2008_0624_173315d 30.628°N -88.278°W
2008_0624_172347d 30.353°N -88.509°W
2008_0624_172127d 30.285°N -88.563°W
> 500 photos - too many results to Zip
Imagery ©2013 TerraMetrics, Map data ©2013 Google, INEGI - Terms of Use

File Retrieval



Next Step: Where do we go from here?

- Integrate other data sets
  - Xstorms (done)
  - Lidar Vertical imagery (EAARL)
  - NWRC Wetlands (Lafayette)
  - USGS Photo Database (Reston)
  - Other Photo Databases?
- Integrate other data types
  - Vertical photography
  - Ground photography
  - Non-coastal images
  - Underwater images
- Expand search possibilities
  - Place names?

Conclusions: What did we learn?

- Use cases are a good way to brain storm, strategized and develop a tool. However, you must have a narrow, focused plan. Don't try to do too much.

- Using the technologies and experts already on hand can reduce the development costs until such time as you have proof of concept.

- Don't try to do everything at once. Iterate, iterate, iterate. The process of revisiting each new version sparked ideas and expansions for the next version. This is the rapid development part.

- We learned a lot as we went about the nature of Use Cases. What to include, what not to include, how to approach each problem and how seeing one thing work (or not) would spark ideas for the next iteration.

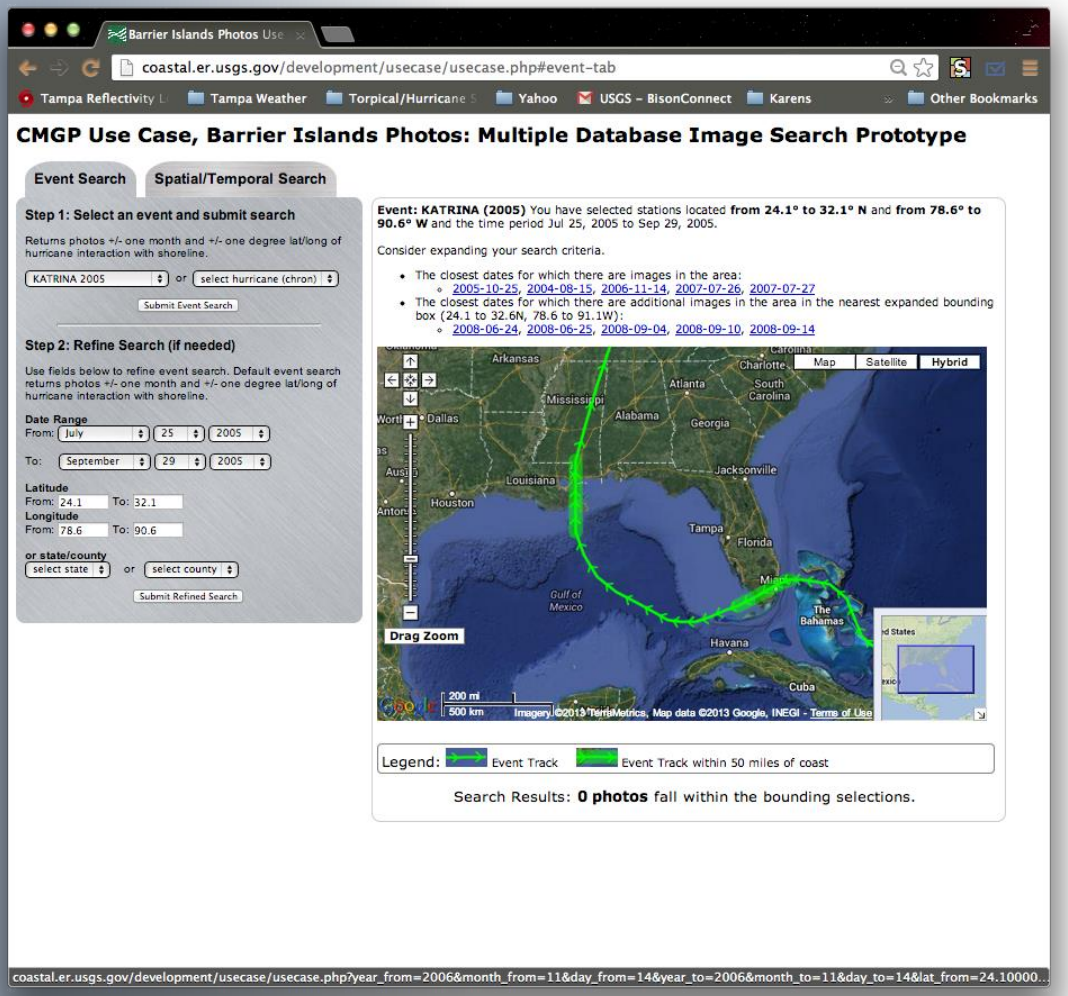
Questions?

- **Contact Email:**
  - **Karen L. M. Morgan**

    kmorgan@usgs.gov

Thank you

Next Step:


Barrier Islands Photos Use
coastal.er.usgs.gov/development/usecase/usecase.php#event-tab
Tampa Reflectivity
Tampa Weather
Torpical/Hurricane
Yahoo
USGS – BisonConnect
Karens
Other Bookmarks
CMGP Use Case, Barrier Islands Photos: Multiple Database Image Search Prototype
Event Search
Spatial/Temporal Search
Step 1: Select an event and submit search
Returns photos +/- one month and +/- one degree lat/long of hurricane interaction with shoreline.
KATRINA 2005
or
select hurricane (chron)
Submit Event Search
Step 2: Refine Search (if needed)
Use fields below to refine event search. Default event search returns photos +/- one month and +/- one degree lat/long of hurricane interaction with shoreline.
Date Range
From: July 25 2005
To: September 29 2005
Latitude
From: 24.1 To: 32.1
Longitude
From: 78.6 To: 90.6
or state/county
select state
or
select county
Submit Refined Search
Event: KATRINA (2005) You have selected stations located from 24.1° to 32.1° N and from 78.6° to 90.6° W and the time period Jul 25, 2005 to Sep 29, 2005.
Consider expanding your search criteria.
The closest dates for which there are images in the area:
2005-10-25, 2004-08-15, 2006-11-14, 2007-07-26, 2007-07-27
The closest dates for which there are additional images in the area in the nearest expanded bounding box (24.1 to 32.6N, 78.6 to 91.1W):
2008-06-24, 2008-06-25, 2008-09-04, 2008-09-10, 2008-09-14
Map
Satellite
Hybrid
Arkansas
Atlanta
Charlotte
South Carolina
Mississippi
Alabama
Georgia
Dallas
Louisiana
Jacksonville
Houston
Tampa
Florida
Gulf of Mexico
The Bahamas
Havana
Cuba
Drag Zoom
200 mi
500 km
Imagery ©2013 TerraMetrics, Map data ©2013 Google, INEGI - Terms of Use
Legend: Event Track Event Track within 50 miles of coast
Search Results: 0 photos fall within the bounding selections.
coastal.er.usgs.gov/development/usecase/usecase.php?year_from=2006&month_from=11&day_from=14&year_to=2006&month_to=11&day_to=14&lat_from=24.10000...